“Analysis of classifiers with different attributes related with Agriculture patterns using Deep Learning”

For Degree of Philosophy in Computer Science

Under faculty of Science & Technology

Synopsis

Submitting to

Swami Ramanand Teerth Marathwada University, Nanded

Submitted By

Pranita Digambar Sherkhane

Research Scholar

Under Guidance of

Dr. N. S. Ratnaparkhi

Assistant Professor

Dnyanopasak Shikshan Mandal’s

Arts, Commerce and science College

Jintur - 431509

Abstract of proposed work:

Deep learning constitutes a recent, modern technique for image processing and data analysis, with promising results and large potential. As deep learning has been successfully applied in various domains, it has recently entered also the domain of agriculture.

A classifier in machine learning is **an algorithm that automatically orders or categorizes data into one or more of a set of "classes".** Basically, India is an agricultural country and the agriculture is considered to be the backbone of the country's economy. 54.6% of the total workforce is engaged in agricultural and allied sector activities.

This research carried out for real-time crop monitoring and yield forecasting. Various agro-physical parameters such as rainfall, soil texture, crops and cropping systems, cultivation, harvesting, classification of crops along with the agricultural area derived from remote sensing data were integrated using Deep Learning Algorithms.

It is easy to get the information about that area where human cannot check the condition every day and help in gathering the data with the help of remote sensing.

Introduction:

Agriculture plays a vital role in the district's economy. Most of the people in Maharashtra are mainly depending on income from agriculture. Proper land use planning is essential for a sustainable development of agriculture.

To date, no research has been carried out comparing the performance of different classifiers in the mapping of the Nanded, Parbhani rural area, nor the implementation of an artificial neural network algorithm for these areas.

Remote sensing, the ability to obtain information about an area or object without direct physical contact, in today's time, acts as one of the biggest inputs for data-driven smart agriculture.

Artificial intelligence gives a way to monitor the crop and to predict the yield in an automatized outcome. The study has been made on the deep learning and its hybrid techniques such as Artificial neural network, deep neural network and Recurrent neural network. It helped to identify how the technology of artificial intelligence helps to improve the crop yield, predict harvesting time.

The research study clearly gives the idea and need of artificial intelligence and deep learning in the field of agriculture. The results were analyzed and the future perspectives were drawn with the obtained outcome. This enables people to more easily see, analyse, and understand patterns and relationships

With deep learning we can develop a algorithm to identify agricultural land and area, Crop identification, growth conditions of crop. It also serves as a reliable method of predicting the yield over a given cultivation cycle and in identifying the right time to harvest based on the climatic conditions.

A classifier is the algorithm itself – the rules used by machines to classify data. A classification model, on the other hand, is the end result of your classifier's machine learning. The model is trained using the classifier, so that the model, ultimately, classifies given data.

There are both supervised and unsupervised classifiers. Unsupervised machine learning classifiers are fed only unlabelled datasets, which they classify according to pattern recognition or structures and anomalies in the data. Supervised and semi-supervised classifiers are fed training datasets, from which they learn to classify data according to predetermined categories.

In this study we compare and analyse which classifier works better in agriculture domain and also develop a classifier model for this study.

Aim And Objectives of study:

The aim of this research is Image classification, analysis, extraction, restoration of agricultural land. The aim will be supported by following objectives. The main

objectives are given below:

- Artificial neural networks were developed for crop classification.
- Study and analysis of different agricultural land cover.
- Compare Deep learning algorithms and develop and model a algorithm which work best in this work domain.
- Implementation of image processing and statistical techniques for analysis of agricultural land using artificial intelligence and deep learning classifiers.
- To recommend suitable crops system to ensure precision agriculture through a novel approach.
- Crop identification, classification and monitoring growth conditions of crop.
- Predicting the yield over a given cultivation cycle and identifying the right time to harvest based on the climatic conditions.

Review of Literature:

1. According to A Survey of Deep Learning in Agriculture: Techniques and Their Applications, article says with promising results and enormous capability, deep learning technology has attracted more and more attention to both theoretical research and applications for a variety of image processing and computer vision tasks. The survey shows that deep learning-based research has superior performance in terms of accuracy, which is beyond the standard machine learning techniques nowadays.
2. According to article by **Marco Castelo**, Universidad de Almería "Deep learning for land use and land cover classification from the Ecuadorian Paramo" Says, using satellite imagery using several classifiers and determine which one obtains the best performance, for which three different approaches were applied. carry out LULC classification in the province of Tungurahua, Quero district and the surrounding areas using three methods: PBIA, GOBIA, and DNN adding different characteristics such

as NDBI, BSI, texture, altitude, and slope. The analysis focused on determining the level of accuracy when using satellite imagery in this type of region.

3. A project Forecasting Agricultural output using Space, Agro-meteorology and Land based observations (FASAL) by Shibendu S. Ray, Anil Sood, Gargi Das, S. Panigrahy states that State level spatial databases of various agro-physical parameters such as rainfall, soil texture, physiography and problem soil along with the agricultural area derived from remote sensing data were integrated using GIS. A raster-based modelling approach was followed to arrive at suitable zones for practicing different cropping systems.
4. According to Suchitra M. S. she proved that Data mining and machine learning techniques help create a crop recommendation system for a specific Agro-Ecological Unit and predict suitable crops in ranking order for a given location with its soil nutrient status. The primary goal is to assist farmers in selecting crops for the farmer's next cultivation period. Given a region and its soil parameters as data, the model should prescribe the best crops for that particular region based on the given parameters.
5. According to CASE STUDY OF BIJNOR DISTRICT, INDIA by Mubashir Jamil, Haroon Sajjad Cropping system analysis is essential for studying the sustainability of agriculture. Timely information about present cropping pattern and cropping pattern change is a pre requisite to devise an ideal cropping pattern within an agro-ecological region. Remote sensing and Geographical Information System (GIS) has become very useful tools for the management of dynamic agricultural resource (12). Satellite imagery has made it possible to map croplands and identify crop types at local, regional and global level [(13)-(17)]. In recent times satellite data has proved to be a valuable source to acquire timely, cost effective and precise information in spatial domain about the existing cropping systems
6. According to Sambhaji Tamsekar stated in GIS Based Decision Support System for Crop Selection, tries to build an integrated crop selection prediction model using GIS and machine learning methods as a vital and complex process in farming is crop selection data set used for the study consists of soil health details of Farms and records of Crop cultivation, he compares the algorithm which can predict the crop using parameters present in the data set to build decision support system.
7. According to Ramling Shivpuje, Land Use Land Cover analysis and different algorithms for Analysis of Land. He collected primary data means reports, toposheets, ground survey, and Google earth data. GIS and legacy means remote sensing images collected from authorized sources and further processing such as georeferencing, mosaicking, spectral analysis, band rationing, image enhancement, image classification is done using several different methods, unsupervised, supervised, and object based.
8. According B. Anil, he stated in An integrated approach for groundwater assessment of Sita Swarna river basin Karnataka India using RS and GIS applications that estimation of the amount of surface runoff using a GIS-based Curve Number as well as the hydrological soil group and antecedent moisture condition, To make use of RS/GIS technology and appropriate method/algorithm to estimate the surface runoff, evapotranspiration and identify the potential groundwater prospect zones in an integrated approach.

9. Marshet Nigatu Gebeyehu* Jimma University, Ethiopia, says, y. Applications of different remote sensing techniques are important for crop monitoring, crop condition assessment and yield estimation for sustainability of agriculture and natural resources. The spectral information is the important aspect of remote sensing data for crop modeling and it is strongly related with canopy parameters which are the representative of crop health and crop growth stages. Remote sensing and GIS can also be used very effectively in land use / land cover analysis as well as damage assessment because of drought, floods and other extreme weather events. Information on meteorology and vegetation are the two major important inputs into agricultural.
10. Pavneet Kaur Kingra, Debjyoti Majumder, Som Pal Singh Says, Remote sensing and GIS can also be used very effectively in land use / land cover analysis as well as damage assessment because of drought, floods and other extreme weather events An attempt has been made in the present study to review, analyse and evaluate the latest information regarding the application of remote sensing techniques for crop monitoring, crop condition assessment and yield estimation for sustainability of agriculture and natural resources under changing climatic scenarios.

Methodology to be adopted:

Convolutional Neural Networks (CNN) is the most widely used deep learning algorithm in these studies, and the other widely used deep learning algorithms are Long-Short Term Memory (LSTM) and Deep Neural Networks (DNN). We investigated these selected studies carefully, analyzed the methods and features used, and provided suggestions for further research. According to our analysis, the most used features are crops, temperature, rainfall, and soil type, and the most applied algorithm is Artificial Neural Networks in these models.

We examine the particular agricultural problems under study, the specific models and frameworks employed, the sources, nature and pre-processing of data used, and the overall performance achieved according to the metrics used at each work under study. Moreover, we study comparisons of deep learning classifiers with other existing popular techniques, in respect to differences in classification or regression performance. Our findings indicate that deep learning provides high accuracy, outperforming existing commonly used classifiers.

Multi-date satellite data from the Indian Remote Sensing Satellite was used for the generation of the cropping pattern and crop rotation during Rabi and Kharif seasons in Maharashtra.

Various machine learning techniques such as prediction, classification, regression and clustering are utilized to forecast crop yield. Artificial neural networks, support vector machines, linear and logistic regression, decision trees, Naïve Bayes are some of the algorithms used to implement prediction. However, the selection of the appropriate algorithm from the pool of available algorithms imposes challenge to the us with respect to the chosen area.

Comparative study to check which algorithm work better in this field of study and also to develop new algorithm-based model using programming language like Python.

Scope and Significance of the Study:

The pertinent question for agri-businesses isn't about deciding whether or not to engage in smart data-driven agricultural practices, it lies in identifying the right solution that combines technology and agricultural know-how in a manner that makes the most sense for them given their current challenges and finding smarter ways of overcoming them.

The applications of those software or techniques are very new to the agriculture domain still much more exploration is needed in this part. New software's are developing in different parts of the world and remote sensing, deep learning. Today farmers understand the beneficiaries of these kinds of techniques to the farm field which help in increasing productivity that will help future generation as technology is hype in traditional system of farming.

Problem Statement:

Deep learning and machine learning techniques help create a crop identification and classification system for a specific Agro-Ecological Unit. And predict yield estimation, harvest time estimation for particular crop.

A multi attribute analysis is performed using the dataset obtained to identify the appropriate crops, classify them accordingly for particular location.

Proposed work Plan/ Formulation and Structure of Study:

Year-wise Plan of work and targets to be achieved:

2021-2022:

- Collection of Research Papers
- Complete Course Work.
- Study of different Deep learning classifiers.
- Participate Seminar/Conferences/Training Related Subject.

2022-2023:

- Manually database will be created.
- Collection of Research Papers.
- Two or Three Research Papers published.

2023-2024:

- Study of AI, Deep learning algorithms.
- Feature extraction techniques implemented in software.
- Two or Three Research Papers published.

2023-2024:

- Study of Deep learning techniques.
- Feature extraction techniques implemented in software.
- Algorithms are developed.

- Algorithm is Tested different Circumstances.
- Two or Three Research papers published.

References:

- https://www.researchgate.net/publication/361390489_Deep_learning_for_land_use_and_land_cover_classification_from_the_Ecuadorian_Paramo
- https://www.sciencedirect.com/science/article/abs/pii/S0034425718305418
- http://hdl.handle.net/10603/360624
- https://www.researchgate.net/publication/226382093_USE_of_GIS_and_remote_sensing_for_crop_diversification_-_A_case_study_for_Punjab_State
- https://www.researchgate.net/publication/309010687_DERIVING_CROPPING_SYSTEM_EFFICIENCY_PATTERN_USING_REMOTE_SENSING_AND_GIS_A_CASE_STUDY_OF_BIJNOR_DISTRICT_INDIA
- https://www.researchgate.net/publication/358816812_APPLICATION_OF_REMOTE_SENSING_AND_GIS_IN_AGRICULTURE
- http://hdl.handle.net/10603/321718, GIS Education in Gujarat Present Status Challenges in Implementation and Future Prospects
- http://hdl.handle.net/10603/258178
- http://hdl.handle.net/10603/380199
- https://iopscience.iop.org/article/10.1088/1755-1315/614/1/012138/meta
- https://doi.org/10.1016/j.compag.2018.02.016.
- (https://www.sciencedirect.com/science/article/pii/S0168169917308803)
- https://www.sciencedirect.com/science/article/abs/pii/S0168192320303774
- https://www.mdpi.com/2072-4292/13/9/1715

- ✓ http://hdl.handle.net/10603/230035
- ✓ http://hdl.handle.net/10603/122513, Land suitability analysis using remote Sensing and GIS A case study of upper Mula and Pravara basin
- ✓ https://www.researchgate.net/publication/354182987_Remote_sensing_and_GIS_application_for_land_resources_appraisal_of_Ridhora_watershed_in_Nagpur_district_Maharashtra Remote sensing and GIS application for land resources appraisal of Ridhora watershed in Nagpur district, Maharashtra.
- ✓ http://hdl.handle.net/10603/376743, Development of Geohybrid Intelligent Model Using Soft Computing Gis and Remote Sensing
- ✓ https://juniperpublishers.com/ijesnr/pdf/IJESNR.MS.ID.556009.pdf, Remote Sensing and GIS Application in Agriculture and Natural Resource Management
- ✓ https://www.researchgate.net/publication/307559931_Application_of_Remote_Sensing_and_Gis_in_Agriculture_and_Natural_Resource_Management_Under_Changing_Climatic_Conditions

Signature

Research Scholar
(Pranita Digambar Sherkhane)

Signature

Research Guide
(Dr. Nayana. S. Ratnaparkhi)

Dr. Nayana S. Ratnaparkhi
Research Supervisor
D.S.M.College, Jintur Dist.Parbhani